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THE EDITORS SAY:

Research: Too Theoretical Or Too Practical?

Which is more valuable to education, basic research or action research? Which is needed more critically in 1953, pure research dealing with fundamental issues or planning which will incorporate the findings of research into everyday practice? Questions similar to these were implied, if not asked, during many of the discussions at the Fifth Annual Conference on Educational Research held in Santa Barbara last fall. A wide range of meaning was given the concept of research. To some it was synonymous with generalizations derived under controlled conditions. Others thought of research as providing answers to specific questions for tomorrow's meeting of the Board of Education.

Those participants of the conference who were closest to the work of school research departments either as directors or school administrators appeared to agree that the chief responsibilities of such organizations included locating information required for making pressing, immediate decisions, collecting and tabulating routine data, supervising the testing program, and preparing summaries of important facts for the staff, the Board of Education or the community. On the other hand, many representatives of teacher training institutions, the "ivory tower mob," while recognizing that these services are essential to the efficient operation of a school system, objected to having them labelled "research."

To the present writer most of these differences are largely semantic. Much of the apparent dichotomy between theory and practice in research arises out of varying the emphasis on long range or on immediate objectives. Well-planned research can include both. Research can be designed to deal with the realistic and timely problems faced by the schools today and at the same time provide for adequate sampling, meaningful comparison, and logical analysis of the data. Much so-called action research could have greater generalized significance if it were more carefully planned from its inception.

(Continued on Page 25)

The California Educational Research Association has announced that its annual conference for the current school year will be held March 19 and 20, 1954, on the University of California Campus at Davis. Those interested in presenting papers at the Conference should contact Dr. Merle H. Elliott, Director of Research, Oakland Public Schools, 1025 Second Avenue, Oakland 6, California.

Are Educational Researchers Prepared To Do Meaningful Research?

ARTHUR P. COLADARCI

The term "meaningfulness' is invoked frequently by those of us who have pleaded for research efforts that will bear directly upon the pressing problems that daily confront the teacher, supervisor and administrator. If one uses as a criterion the *number* of such studies appearing during the past few years, it would seem that these pleas have borne some fruit. If one uses qualitative criteria, however, these research efforts are all too frequently less "meaningful" than they purport to be.

The concern here will not be with the question of our competence with the techniques of manipulating data. There are already many criticisms in this regard on the current record ranging from Norton and Lindquist's (10) charge that we are not sufficiently familiar with the techniques we employ, to Bloomers' (2) assertion that we have shown virtually no improvement in the last decade. If such criticisms are valid, the weaknesses that prompt them can be easily identified and remedied.

Two Essential Problems

Overlooking the matter of technical competence, two nuclear problems stand out sharply when one examines the research efforts that purport to be "meaningful"—i.e., directly relevant to educational practice: (1) the tendency to overlook the integrity of the theory-practice relationship and (2) the rather common insensivitity to the valuational dimension in educational research.

All too frequently the conclusions of a research report suggest the assumption that there is a one-to-one relationship between a specific educational procedure and a specific educational situation and that this relationship exhausts all possible relationships between the two. Such handbook-like prescriptions are precluded, of course, by systematic differences in behavior theory, the relative instability of behavior data, and variations in educational purposes. Teaching methods, curricula, and forms of educational organization are better viewed as *hypotheses-being-tested*—the term "educational practice" must be seen as equivalent to the term "testing educational hypotheses." Any other conception of the "practical" in

Dr. Arthur P. Coladarci joined the staff of Stanford University in February, 1952 and holds the title of associate professor of education and psychology. He had served previously as psychologist in the Child Study Center of Maryland, and later as assistant professor of educational pychology at Indiana University. His Ph.D. was obtained at Yale University in 1950. Dr. Coladarci's article is based on an address given at the 1953 annual Conference of the California Educational Research Association at Stockton.

education may, indeed, be *im*practical in light of the nature of the educative process. To relate research efforts, continuously, to theoretical concerns is not a disservice to "practical" interests—they are mutually inclusive categories.

Following further the foregoing viewpoint, it is submitted that our efforts to build a meaningful educational practice are not well-served by the considerable and increasing number of research people who stay within the locus of the descriptive-survey methodology. That the data gathered by status procedures *may* be necessary to the resolution of educational problems cannot be gainsaid. The point is, however, that such data may be also mere collections of interesting educational information and not deliberate and systematic contributions to educational science. Such a state of affairs need not exist. Presumably, the researcher who undertakes to survey and describe present status has a rationale for the question or questions he is trying to answer. It does not appear presumptuous to demand that he explain *why* he selects the particular question or questions. To do so would be to place the descriptive data within a conceptual matrix and make them more "meaningful" at both the conceptual and "practical" levels of the educative process.

The second of the two problems is perhaps a more crucial one in the sense that its remediation poses some knotty questions. It is not difficult to convince ourselves that, inasmuch as education is a valuational enterprise, educational research has a valuational dimension. Definitions of research problems, research designs, and eventual recommendations for educational practice are not maximally "meaningful" apart from a consideration of the educational ends-in-view involved. Educational practice centers around questions of *desirability;* to insist on attention to matters valuational in educational research is not to introduce any factor not already in it. Those who agree with this view will find an illustration of the need for it in the fact that achievement tests were the most frequently occurring source of data in 1377 research studies reported in the *Journal of Educational Research.* (13) Current educational objectives, ambiguous as they may often be, would suggest the need for much more attention to other behavior criteria.[1] Traditionally respectable questions and designs need re-evaluation in light of newer educational purposes. Hilgard's (6) recent plea for "enriched research' is a recognition of this need.

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[1] Quite possibly, the researcher's tendency to confine himself to neatly "objectified" psychometrics is less indicative of an insensitivity to modern educational objectimes than it is a consequence of the intolerance for ambiguity that is euphemistically called "rigorous research methodology." (In this connection, consider the interesting projection that "projective techniques are cultish.")

The Personal Factor

There is another side to this valuational coin—the valuations of the researcher himself and how they relate to his research behavior. Consider, for instance the following statement by Ellis:

> . . . since human beings cannot avoid being evaluative in their factual presentations, since scientists are uniquely trained to handle, analyze, and interpret facts and since if they do not present their frank evaluations of data some other less trained, less accurate, and more biased groups certainly will, it would seem to be not only desirable but absolutely imperative for scientific workers to interpret, consciously, honestly, and forthrightly, the values implied by the facts at their command. [2]

The particular aspect of this problem that we wish to emphasize here is well stated by Bruce:

> Indeed, the educational psychologist may need to analyze his own preconceptions concerning values, so they become as explicit as possible to the end that he may be aware of the factors underlying his own choices of problems and his emphases rather than assume a scientific basis, where it may not exist. [3]

The recent literature of the behavior sciences and the methodology of science reinforces the need for attention to this aspect of research competence. Much of the material in one of the most recent volumes on personality helps to focus this concern in psychological terms. (1) The importance of unconscious value judgments in sociological interpretations has been shown by Myrdal (9) and Wolff (15). Such studies as those of Bruner and Goodman (4) and Postman, Bruner and McGinnies (11) have demonstrated that personal values are demonstrable determinants of what one selects perceptually from his environment. Nor does one have to be of a field-theoretical persuasion to accept this position. Hull (7), for instance, sees a crucial relationship between moral values and scientific methodology. Kattsoff (8) suggests that one of the "mistakes" made in the development of the social sciences was that "a careful distinction was not drawn between the emotional valuations of the scientist as a person and the valuations of the person whose behavior was being studied." The issues are joined for the anthropologists in a recent paper by Siegel (14). Reichenbach notes that:

> In some sense, every human activity serves the pursuit of a goal. . . . In all such activities, however, there are moments where a choice is to be made; it is here that behavior exhibits valuation. The valuation need not be explicitly stated, nor achieved through reflection and comparison; it may be performed in the spontaneous impluse which drives us to read a book or to see a friend or to attend a concert. But in the decisions made we express our preferences and thus indicate through our behavior the valuational order which constitutes the background of our actions.[4]

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[2] Albert Ellis, "Valuation in Presenting Scientific Data," *Sociology and Social Research*, November-December, 1948. p. 96.

[3] William F. Bruce, "How a Psychological Approach to Human Values Clarifies Educational Objectives," *Journal of Educational Psychology*, March, 1948. p. 160.

[4] Hans Reichenbach, *The Rise of Scientific Philosophy*, University of California Press, 1951. pp. 313-14.

Restrictions of space, preclude further explication of the point of view and the problems that flow from it. It does appear clear, however, that if the educational researcher is not sensitive to the objectives of the modern school, the problems he selects and the procedures he uses will have no *necessary* strategic relevance to the educative process: if he is not interested in and trained to clarify and take into account his own value assumptions, we shall continue to be plagued with educational research that contains hidden valuations and, therefore, misleading communication.

It is hoped that the foregoing remarks at least have identified the locus of the writer's concern. In any heuristic sense of the term "meaningful," it would appear that our research activities and our advanced graduate programs stand to profit from further analysis and clarification of the related theoretical and valuational dimensions in educational research. Such attention, it is felt here, is mandatory if the term "educational science" is to be something more than a secular prayer.

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The Measurement Of Interests In Nonprofessional Vocations By Means Of A Pictorial Inventory

KURT P. WEINGARTEN

Introduction

The measurement of occupational interests has become an important part of the general testing program in many secondary schools which are concerned with the proper development and guidance of students. The knowledge of an individual's interests may provide valuable information as to possible occupations which he may successfully pursue. The major part of the male adult population must earn a livelihood in some occupation. Since individuals tend to do their best work on jobs in which they demonstrate interests, the determination of vocational preferences is of paramount importance.

There are a number of interest measuring devices which are dependent upon reading and the understanding and interpretation of words. Reading difficulties and ignorance or uncertainty of terms used limit the usability of these verbal tests. Many "interest inventories" are primarily concerned with the professional and semiprofessional fields.

Purpose of the Study

The purpose of this study was to determine occupational interests of boys by presenting illustrations of men at work in various nonprofessional vocations. The study was designed to answer the following questions: (1) To what extent are occupational illustrations statistically usable devices for determining nonprofessional vocational interests? (2) To what extent are occupational illustrations reliable measures of nonprofessional occupational interests? (3) Is the use of occupational illustrations a valid method for determining nonprofessional occupational interests?

The pictorial interest inventory was developed to permit the nonreader, the slow reader, and the student with low academic ability to determine his vocational interests in certain skilled, semiskilled, and unskilled occupations. Eight hundred and twenty boys in grades 7 through 12, selected at random, in five California schools took part in the testing program.

Dr. Kurt P. Weingarten is a counselor at the Gonzales (California) Union High School. He had previously taught in the San Diego City Schools, and served as a public accountant in Los Angeles. His article is based on his doctoral dissertation which was completed at the University of Southern California in 1953.

The pictorial interest inventory consists of fifty cards, three drawings on a card, a total of 150 illustrations. The following six occupational areas were depicted in the drawings: (1) artistic, (2) business, (3) handicraft, (4) mechanical, (5) natural, and (6) service occupations.

In the artistic occupations, work connected with art is depicted, with emphasis on the commercial aspects. The business occupations concentrate on office work, computational and clerical vocations. The handicraft occupations include those manual pursuits in which tools are often used, but where no special degree of aptitude or manual dexterity is necessary. Bricklayers or plasterers are examples of this group. Vocations in which more skill and greater manual dexterity are usually required are presented in the mechanical occupations. Examples in this group include watchmakers or radio repairmen. Agriculture and related work are emphasized in the natural occupations. The service occupations include those vocations which pertain to service to individuals or groups of people, for example, salesmen or waiters.

Thirty illustrations of men engaged in various nonvocational activities were included among the drawings in order to conceal the vocational design of the pictorial interest inventory. The individuals taking the inventory were not informed that the test was designed to determine vocational interests. Of the three pictures on each card the subjects were directed to select the one they liked best. The above design of testing was based on the assumption that individuals tend to identify themselves with the illustrations they select. This procedure also afforded an opportunity to obtain occupational interests which were not consciously distorted. The inventory is nonverbal, except for the directions for marking the illustrations selected.

The chi-square method for testing experimental hypotheses was applied to determine the deviation from chance selection. It was found that of the twenty illustrations used to represent each occupational field, to have statistical significance at least twelve at the six per cent or thirteen at the one per cent level needed to be chosen to demonstrate occupational interest. Selection of no more than two illustrations of the six per cent or one illustration at the one per cent level of significance was interpreted to show a definite lack of interest in an occupational area.

As one phase of testing the validity of the pictorial interest inventory, the Lee-Thorpe Occupational Interest Inventory was given to the boys who had previously taken the pictorial interest inventory. Furthermore, recorded Kuder Preference Record data were used in the validation of the pictorial interest inventory. Expressed vocational interests were also obtained and compared with the frequencies of significant scores obtained on the pictorial interest inventory. In order to determine the reliability of the pictorial interest inventory, 196 boys took part in a test-retest study.

Since significance or nonsignificance of scores and not quantitative values were used in all comparisons made, the chi-square formula was applied to obtain coefficients of contingency. These coefficients are comparable to Pearson correlation values.

Findings and Conclusions:

(1) Approximately 84 per cent of the boys who participated in the testing obtained scores significant at the six per cent level in one or more occupational areas. At the one per cent level of significance, approximately 70 per cent of all boys who took the pictorial interest inventory obtained significant scores in one or more occupational areas. In other words, 7 out of 10 boys selected at least thirteen illustrations or not more than one drawing in one or more occupational areas of the pictorial interest inventory. These findings indicated that the pictorial interest inventory as used in this study was a statistically usable device for determining occupational interests of boys in nonprofessional fields. It was further found that a consistently higher percentage of boys with low intelligence quotients (below 90) obtained significant scores on the pictorial interest inventory than boys with high intelligence quotients (above 110).

(2) The following coefficients of contingency (C values) were determined from the comparisons of frequencies of the test and retest reliability study: artistic occupations, .78; business occupations, .76; handicraft occupations, .39; mechanical occupations, .72; natural occupations, .74; and service occupations, .59. Since the maximum possible value in a design (3 x 3) as used in this comparison is .81, the findings indicated substantial to moderate correlation between the two testings. These reliability values compare favorably with reliability data of other interest inventories.

(3) The comparisons of frequencies of significant scores obtained on the pictorial interest inventory and the Lee-Thorpe Occupational Interest Inventory showed positive correlations in all six fields. All chi-square values were significant at the one per cent level. Significant scores on the Lee-Thorpe Occupational Interest Inventory were defined as scores from the 1st to the 19th and from the 80th to the 99th percentiles in one occupational area.

The following coefficients of contingency were calculated from the comparisons of frequencies of scores obtained on the Lee-Thorpe Occupational Interest Inventory and the pictorial interest inventory; artistic occupations, .69; business occupations, .65; handicraft occupations, .28; mechanical occupations, 66; natural occupations, 68; and service occupations, .52. The maximum possible value in a design (3 x 3) as used in these comparisons is .81. These findings indicated that the pictorial interest inventory and the Lee-Thorpe Occupational Interest Inventory were measuring similar occupational interests in the fields that were compared.

(4) The comparisons of frequencies of significant scores obtained on the pictorial interest inventory and the Kuder Preference Record showed positive correlation in the three occupational fields which were used. All chi-square values were significant at the one per cent level. Significant scores on the Kuder Preference Record were defined as scores from the 80th to the 99th percentile in an occupational area.

The following coefficients of contingency were determined from the comparisons of the frequencies obtained on the Kuder Preference Record and the pictorial interest inventory: artistic occupations, .46; business occupations, .46; and mechanical occupations, .43. These findings gave evidence that the pictorial interest inventory and the Kuder Preference Record tended to measure similar occupational interests in the compared fields.

(5) The following coefficients of contingency were calculated from the comparisons of frequencies of expressed vocational interests and significantly high scores obtained on the pictorial interest inventory in these vocations: artistic occupations, .48; business occupations, .51; handicraft occupations, .43; mechanical occupations, .51; natural occupations, .50; and service occupations, .54. Since the maximum possible value in a design (2 x 2) as used in these comparisons is .70, the findings indicated that substantial correlation between expressed vocational interests and significantly high scores obtained on the pictorial interest inventory existed.

In summary, it may be concluded from the research that:

(1) The pictorial interest inventory may be used to obtain occupational interests of non-readers and slow readers in nonprofessional vocations, since substantial agreement existed between expressed interests and significantly high scores obtained in the various occupational fields on two widely used occupational interest tests.

(2) The pictorial interest inventory may be used more effectively with boys of below average ability (as measured by intelligence quotients), since a consistently higher percentage of boys obtained significant scores in the lower intelligence quotient groups.

(3) The pictorial interest inventory, as it was used in this study, appears to have definite values as an instrument for measuring vocational interests of boys in nonprofessional occupations, since substantial agreement with other interest measuring devices was established.

Two Kinds Of Research

W. H. Cowley

Address delivered at the Fifth Annual State Conference on Educational Research, November 6, 1953

Education, like all arenas of thought and action, attacks its problems in one of two ways—factually and conceptually. Ideally both kinds of research should be combined, but often they are not. In any case, the two approaches can be discussed separately.

Until about 60 years ago American educationists spent little time seeking out the facts. They dealt entirely with concepts. At the turn of the century, however, Rice, Thorndike, Judd, and a host of others revolutionized the study of education by putting their emphasis upon "getting the facts." They produced such important results that soon the great majority of educationists largely abandoned wide-ranging conceptual thinking and gave their allegiance to what came to be known as "educational research," "the factual approach,' and "the science of education."

Facts Alone Not Enough

The change proved to be tremendously valuable, and hard fact drove much windy theory from the center of the stage. In time it became apparent, however, that educational scientists or researchers had put their stress upon onl yhalf the scientific enterprise, to wit, upon the collection of facts to the neglect of their conceptual organization and explanation. It also became apparent that many vital educational problems can not be handled by the tools employed by educational science. Otherwise expressed, a few educationists began to see that the great majority of the decisions made in education result from debate about concepts rather than from the findings of educational research and, further, that in the light of the tools available to educational science, this would of necessity continue to be true for a long while.

A reaction to the factual emphasis set in, therefore, about 1929; and John Dewey precipitated it in a series of writings including his *Sources of*

W. H. Cowley received his bachelor's degree from Darthmouth and his doctorate from Chicago. He has also received degrees from Hamilton, St. Lawrence, Hobart, and Union Colleges. He was president of Hamilton College from 1938 to 1944, where he carried out many innovations in the program. He has been professor of higher education at Stanford University since 1945. In addition to his interest in educational research, Professor Cowley has been concerned with student personnel work, history and philosophy of higher education, and social psychology.

the Science of Education, his piece on "Philosophy" in the *Encyclopedia of the Social Sciences*, and his book *Experience and Education*. A quotation from the latter two exhibit his criticism of facts adrift from major concepts:

> The notion that science proceeds merely by the accumulation of observations unregulated by theory has no support from the history of scientific inquiry. *Encyclopedia of the Social Sciences*, 12:125.
>
> . . . the experimental method of science attaches more importance, not less, to ideas than do other methods. There is no such thing as experimentation in the scientific sense unless action is directed by some leading idea. *Experience and Education*, 109.

This Dewey protest against considering factual research to be the *only* kind of educational research has been salutatory; but unfortunately most of those engaged in it today—a quarter of a century after Dewey's campaign began—continue to believe, it would seem, that factual research and only factual research, deserves honoring and supporting. This point of view, however, seriously limits the kinds of problems to which educational researchers give their attention.

Examples of Conceptual Research

For example, two of the most insistent questions before American education today are, first, how education shall be structured, and second, the meaning and proper status of the involved concept of academic freedom. Neither of these crucial problems appears to be amenable to attack initially at least from the factualist point of view. Both must first be explored conceptually. This means tracing the history of the ideas involved in them and appraising their present status and their future prospects in the light of the historical continuums thus plotted. Only when this has been done is it possible to decide what factual investigations have relevance.

These are, of course, only illustrations. They need elaboration and can be matched by citing scores of comparable problems. In any event, they lead to two generalizations: first, that conceptual research is antecedent to factual research and, second, that the two kinds of research supplement one another, both needing to be undertaken on all educational issues.

An Investigation Of The Interpretation Of Written Problems Among College Students

BERT Y. KERSH

The ability to interpret problems is considered by this writer to be more fundamental than such skills in reading as remembering content and reading rapidly. It is thought of more as a process of thinking for which reading ability can serve as a tool but little more, and that, by its very nature, mental ability is most akin to it.

From this point of view, a person skilled in reading might have an advantage over a person less skilled, in such variables as amount of time required to understand written problems or memory for facts given in the problems, but still both persons might be able to select the facts essential to a problem, to organize these facts and proceed to solve the problem in similar fashion and with equal success. It is also conceivable that the person more skilled in reading might actually prove less able to select essential data, to organize the data and to proceed to solve the problem with success.

Purpose

The purpose of this study was to investigate the thought processes of college students while interpreting problems and solving problems and to attempt to determine the relationship of reading ability and intelligence to variables in the interpretation of problems.

Problem interpretation was defined as the understanding, the selection, and the organization of the given elements of a problem. Problem interpretation was seen to involve two phases: (1) the actual understanding of the language in which the problem is presented, and (2) the formulation of the problem, the selection of a "model of search"[1] which sets limits and gives direction to the solution process.

---

[1] Duncker, K. "On Problem-Solving," *Psychological Monographs*, 58, 5 (1945) pp. 78-79.

Bert Y. Kersh is research assistant in the school education, University of California Berkeley, where he is a candidate for the Ph.D. degree. He had previously served as a clinical psychology technician at the Madigan Army Hospital, Tacoma, Washington. He also served as psychometrist at the University of California (Berkeley) Counseling Center. His article is based on his Master's thesis which was completed just a year ago at the University of California, Berkeley.

The *problem-solving process* was defined as the steps toward the solution recorded by each subject after having interpreted the problem.

Reading ability was defined as speed of reading for comprehension, a skill not necessarily involving the ability to think effectively with the data obtained through reading. Reading ability was measured by the Minnesota Speed of Reading Test, Form A.

Intelligence was defined as those abilities measured by the American Council on Education Psychological Test, 1949 edition. [2]

Hypotheses

The following general hypotheses were tested in this study:

1. The ability to interpret problems among college students is largely independent of the ability to read.
2. The ability to interpret problems is largely dependent upon intelligence.
3. Limitations in the solution process may be traced to limitations in the interpretation of the problem.

Methodology

The experimental test consisted of a problem which was presented in printed form to the subjects who participated in this investigation. When the subjects felt they understood the problem thoroughly, they were asked to write the problem in their own words as they understood it. This represented their interpretation of the problem.

The subjects were then instructed to write their thoughts as they attempted to solve the problem and, subsequently, to select from a prepared list of ideas all those which occurred to them as they were attempting to solve the problem. Thus the problem-solving process was represented by the written protocols plus any additional ideas checked on the list. Despite the obvious limitations to the check list procedure, it was evident in the subsequent analysis that the additional data from the check list enhanced rather than confused or altered the results. It appeared to serve its intended purpose of providing data which would ordinarily have been obtained only through direct inquiry of each person in individual testing.

As a check on the validity of the written interpretations of the problem, the following steps were taken. After having solved the problem and having indicated their thought processes, the subjects were instructed to re-read the original statement of the problem and to describe any corrections or modifications they would wish to make to their interpretations. Subsequent analysis indicated that the original interpretations were seldom changed substantially.

[2] This test is referred to in this report as the ACE Psychological Test.

The problem selected was one used by Duncker for his experiments on problems solving. [3] The text of the problem was modified so as to be more easily understood by the group tested. This is the problem as modified:

> You have seen clocks with a pendulum swinging beneath. Now, in order for such a clock to run accurately, the swings of the pendulum must be strictly regular. Changes in the length of the pendulum will change the running of the clock. You may know that metal expands when heated and contracts when cooled, although to different degrees in different metals. Thus every temperature change would change the length of a pendulum, making the clock run irregularly. How can a pendulum be made so that temperature changes will not alter the over-all length of the pendulum and thus after the regularity of the clock? We are concerned only with the length of the pendulum. Otherwise, the pendulum may have any appearance at all.

An undergraduate class in the Department of Education of the University of California, Berkeley, was used as the sample population for the portion of the investigation reported here. A total of 59 persons were tested. The group consisted of both men and women, ranging in age from 19 to 30, and from the sophomore to the graduate level in college. Otherwise, the group represented a rather broad range of training, primarily from the liberal arts curriculum. Individuals who indicated that they had had special training in physics or who had previously attempted to solve the problem were not included in the analysis.

In addition to the experimental test, the group was given the reading ability test and the ACE Psychological Test. Scores for the ACE Test were obtained for only 35 members of the group, however.

Analysis

The interpretations of the subjects were carefully screened and sorted into groups according to apparent differences in their statement of the problem. This was done without regard for the accuracy or completeness of the interpretations in terms of factual content. In the process of screening the interpretations, safeguards were taken to prevent any bias or predisposed judgments from influencing the sorting. Five groups were isolated. The emphasis within each group may be expressed as follows:

Group 1. The problem is to make (design) the pendulum so that it will not change in length due to temperature change.

Group 2. The problem is to make the pendulum so that temperature changes will not affect the regularity of the clock.

Group 3. The problem is to find a pendulum (of metal or some other material) which will not be affected by temperature change.

Group 4. The problem is to prevent somehow the length of the pendulum from changing with temperature changes.

Group 5. The problem is to somehow maintain the regularity of the clock, or to prevent temperature changes from making the clock run irregularly.

Although each shift in emphasis is subtle, each group, except the first, does represent a change in the way the problem is actually stated. Group 1

[3] Duncker, *Op. cit.*, p. 6.

most nearly represents the problem as it is actually stated. Group 2 fails to specify the goal of the problem in terms of the length of the pendulum. Group 3 greatly limits the problem by implicitly or explicitly specifying that the problem is to construct the pendulum out of some heat-resistant material. Group 4 keeps the length of the pendulum within the center of attention but greatly broadens the possibilities for solving the problem by placing no limits on how the length may be kept constant. Group 5 fails to specify any direction or limitations to the problem.

The subsequent analysis was an attempt to determine similarities or differences between the groups in reading ability, intelligence, in the problem-solving process, and in success in the solution of the problem. The small number of individuals within each group precludes the extensive use of statistics.

Differences in reading ability. The reading scores of persons falling within each group were compared statistically using Fisher's *t* formula to test the significance of the differences between means. The mean reading scores of each group are presented in Table I.

TABLE I

Mean Reading Scores Of The Persons Within Each Group[4]

	Groups				
	1	2	3	4	5
Mean	18.7	16.6	17.5	17.5	18.5

The greatest difference is between Groups 1 and 2, and this difference is significant at only the 50 per cent level of confidence. This indicates that such a difference could well result from chance fluctuations in the sample, and the groups are not significantly different in reading ability. This evidence supports the first hypothesis.

Differences in intelligence. The *t* test was also used to test the mean differences among the groups in terms of the ACE Psychological Test scores. Table II shows the mean ACE Psychological Test scores for each group.

Accepting any difference above the 5 per cent level of confidence as being a significant difference, Groups 1, 3, and 4 fall into a significantly higher level of intelligence than do Groups 2 and 5, and there are no significant differences among the groups at each level. These results support Hypothesis 2.

[4] The groups in the tables refer to the groups described on page 15 of this report. All scores reported are raw scores.

TABLE II

Mean ACE Psychological Test Scores Of Persons Within Each Group

	Groups				
	1	2	3	4	5
Mean	135	114	134	147	124

Study of the differences in the interpretation of the problem indicates that the groups which scored lowest on the ACE Psychological Test failed to focus clearly upon the real point of the problem, i.e., to prevent the length of the pendulum from changing with temperature changes. Consequently, they were handicapped at the outset in their attempts to arrive at the best solution.

Differences in the solution process. Two variables in the solution process were isolated for this analysis: (1) the number of distinct ideas, and (2) the number of apparent shifts in approach or changes in the model of search during the problem-solving process. In the latter case, five areas of search could be identified from the data: (1) regulation of the temperature, (2) regulation of the length of the pendulum, (3) regulation of the weight of the pendulum, (4) regulation of the swing of the pendulum, and (5) regulation of the mechanism within the clock. Each person attempted to solve the problem by successively treating one or more of these areas, even though the problem clearly specified only one, regulation of the length of the pendulum.

The reader is invited to consider the implications of this last finding. Either the problem as it is written is ambiguous to most readers, or there is some other determinant, presumably in the thought process, which causes people to reformulate the problem incorrectly. As often as not the problem was reformulated incorrectly after it had been formulated correctly.

Table III shows the mean number of distinct ideas and the mean number of areas of search in the solution process of the individuals within each group.

The pattern is similar in both cases, and it appears that limitations in the number of areas and the number of ideas can be traced to limitations in the interpretations (Hypothesis 3). The solution processes the Groups 2 and 3 are most limited, followed in order of least limitation by Groups 1, 5 and 4. Group 2 limits the problem to the unspecified task of making a pendulum; Group 3 specifies a certain type of material out of which to construct the pendulum; Group 1 limits the problem to designing the pend-

ulum so that the length will remain constant with temperature change; and Groups 4 and 5 are relatively without limiting factors.

TABLE III

Mean Number Of Ideas And Of Areas Of Search For Each Group

	Groups				
	1	2	3	4	5
Mean no. areas	1.8	1.6	1.6	2.3	2.1
Mean no. ideas	4.1	3.1	3.0	5.1	5.2

Differences in the solution. The solution which best satisfies the problem as stated is to design the pendulum using metals with different coefficients of expansion so that the over-all length will remain constant as the metals expand or contract with temperature changes.

Actually, no one gave the exact answer to the problem. Instead, a variety of solutions was offered. Each search model produced its own solution, and generally the person who attacked the problem from more than one approach produced more than one answer. For instance, if one's thinking is directed toward regulating the temperature, he might give the answer, "enclose the pendulum (or clock) in an insulated container." Then if the same person redirected his thinking towards regulating the length of the pendulum," he might then produce the answer, "use a material which is not affected by temperature change, such as wood or plastic."

Comparing the groups in terms of the mean number of solutions given by the individuals within each group, it is again apparent that the more limiting interpretations are associated with limitations in the number of solutions. Table IV shows the mean number of solutions for each group.

TABLE IV

Mean Number of Solutions For Each Group

	Groups				
	1	2	3	4	5
Mean	2.2	1.6	1.9	2.6	2.5

The pattern is similar to those in Table III showing the mean number of ideas and the mean number of areas of search in the solution process. The individuals who came nearest to describing the best solution as given above were in Groups 1 and 4. These groups formulated the problem most accurately.

Conclusions

On the basis of the limited sample used in this investigation, the following conclusions are offered:

1. The ability to formulate a problem into a meaningful, clearly defined, and accurate search model is not dependent on the ability to read rapidly for comprehension.
2. This same ability is dependent upon intelligence.
3. The number of different approaches to the solution of the problem may be limited by the way the problem is first formulated. Unless the problem is formulated accurately, the best approach to the solution may not be followed.
4. Similarly, the number of ideas in the solution process may be limited by the way the problem is formulated.
5. Success in the solution of the problem is determined in large part by the way the problem is formulated.

AERA Announces Fellowship

The American Educational Research Association is offering a Fellowship in Educational Measurement, made possible by a grant from World Book Company. The person selected will pursue graduate studies at either the predoctoral or postdoctoral level, in the field of educational measurement at an institution of his choice in the metropolitan New York area. He will in addition receive the benefits of a systematic program of practical experience in test research and development in the Division of Test Research and Service of World Book Company and other testing agencies. The Fellowship is awarded for a period of one year, and may be renewed for a second year. It provides a stipend of $2000.

Candidates for the Fellowship should be citizens of the United States, or Canada, resident in either country, who are planning to pursue a professional career in the field of educational measurement in either of these countries. Candidates should have completed at least one year of graduate study in the field of educational measurement or a closely related field at a recognized institution. There are no limits as to age, sex, or marital status of the candidates, although preference will be given to applicants under 35 years of age.

For additional information and for application blanks interested candidates should write to: Fellowship Award Committee, American Educational Research Association, 1201 Sixteenth Street, N. W., Washington 6, D. C. Applications for the school year 1954-55 must be received by March 1, 1954.

The Curricular Implications Of Musical Experience

Louis Jordan Rubin

It is generally assumed that broad musical experience has an effect upon the types of music preferred by students as well as upon their ability to distinguish technical subtleties. The organization and methodology of many secondary school music curricula are built upon this basis. In an attempt to investigate the validity of this assumption, a study was designed to interpret the effect of various kinds of musical experiences on musical preferences and on technical discriminative skill.

Investigative Techniques

A questionnaire, measuring the type and the degree of musical experience, was administered to approximately nine hundred students in the San Francisco Public Schools; three hundred in each of grades seven, nine, and twelve. In each grade the fifty students with the highest scores and the fifty students with the lowest scores were selected. The study sampling thus represented two highly contrasted groups of students with extreme variation in their musical experiences.

The questionnaire described, insofar as possible, all of the opportunities for musical experience, and was based upon thirteen musical areas: private study; class study; chorus, band, and orchestra participation; record collections; dance instruction; home musical environment; attendance at concerts, musical dramas, operas and other musical performances; musical church experiences; listening and viewing of musical radio and television programs; and movie attendance.

Although the questionnaire was a self-report device, effort was made to establish maximum rapport and the responses can be considered as essentially accurate. In the assignment of arbitrary point values for specific items in the scoring of the questionnaire, comparative exactness was of limited importance inasmuch as the purpose was to distinguish two exceptionally contrasted groups.

A test of discriminatory ability and a test of musical preferences was then administered to the sampling in each of the three grades. The test of discriminatory ability consists of 42 paired-comparison items. Each item involves the playing of a musical phrase which has been harmoni-

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Louis Jordan Rubin is a teacher of music in the San Francisco schools. The article is a digest of his doctoral dissertation completed at the University of California, Berkeley, in 1952.

cally, melodically, or rhythmically altered, in conjunction with an unaltered version of the same phrase. The student is asked to indicate (a) whether the two phrases are similar or different, and (b) if the phrases are different, whether the difference lies in the harmony, melody, or rhythm of the music. The items are selected in equal numbers from the frequently performed *repertoires* of folk, popular, and classical music. The concepts of harmony, melody, and rhythm are explained to the student by means of pre-test explanations and sample items. A piano is used to reproduce the two versions of each item. The test is administered by means of a tape recording device. Four scores are yielded: sub-scores for harmonic discrimination, rhythmic discrimination, and melodic discrimination, and a total score. Both the individual items and the total test were validated by means of expert opinion (music teachers and professional musicians) with respect to the nature of alteration. Further evidence of validity was obtained by a measure of internal consistency. The reliability of the test (.85) was computed by the split-half technique, corrected by the Spearman-Brown formula.

The test of musical preferences consists of 45 items. Each item involves the playing of a selected musical passage in its original form. The passages are taken, in equivalent numbers, from the frequently performed repertoires of folk, popular and classical music. The items are reproduced on a tape recording device from their actual performance medium. The 45 items were selected from a preliminary accumulation of 120 classified passages. The test items were selected with the view toward providing a test of the most comprehensive scope with respect to performance medium, musical idiom, and stylistic diversity. Chronologically, for example, the classical items encompass representative styles from Bach through Bartok. The popular items illustrate the musical idioms of dixieland, boogie-woogie, be-bop, Latin-rhythms, popular ballads, and western music. Similarly, the test utilizes solo, ensemble, choral, orchestral and other performance media.

The student scores each item on a four-point scale of preference: dislike—tolerate—like—like very much. Comparative preference scores are obtained for folk music, popular music, and classical music, by summing the scale values assigned to the fifteen items in each of the three categories. A total preference score is obtained by summing these three sub-scores. The reliability of the test (.83) was computed by the split-half technique and corrected by the Spearman-Brown formula. The test was determined to have face validity by means of logical inference.

Unquestionably both tests are handicapped by the structural limitations which are concomitant to the testing devices used. The tests, however, were devised, not to replace less convenient techniques of measurment, but to fill the need for any sort of measuring device whatsoever.

Resulting Data

Analysis of the data indicated that 67 percent of the high groups were girls, and conversely, 64 percent of the low groups were boys. This is probably reflective of our cultural tendency to emphasize the musical training of girls to a greater extent than that of boys. Musical experiences reported by the low groups were as follows: television-viewing, 54 percent; record collections, 78 percent; movie attendance, 81 percent. In contrast, 91 percent of the high groups had deceived private music instruction; 74 percent had received additional school instruction; 49 percent were members of an organized band, chorus, or orchestra; 91 percent reported home record collections. Similar percentages were obtained from the high groups for other related factors in the questionnaire. Instrumental study was reported in the high groups only. In the order mentioned, the most frequently studied instruments were piano, trumpet, violin, cello, and clarinet.

Analysis of the scores on the Test of Discriminatory Ability indicated that rhythmic alterations are easiest for students to perceive. Melodic alterations are slightly more difficult and alterations of harmony are the most difficult for students to recognize. Such results are not surprising when one considers that the listening experiences of most individuals are based predominantly upon the melodic and rhythmic aspects of the musical complex. Discriminatory ability increased slightly from the seventh to the twelfth grade but the increase was not uncommonly significant. In the high groups the mean score of the seventh-grade students was 24, as compared with a mean score of 36 for the twelfth-grade students. In the low groups the mean score of the seventh-grade students was 16, in contrast with a mean score of 21 for the twelfth-grade students.

Although students in the high groups demonstrated superior discriminatory ability the difference between the two groups was surprisingly low. The actual correlation between discriminatory ability, as measured by the test, and musical experience, as measured by the questionnaire, was .31. In view of the extreme contrast in experience between the two groups, however, this difference is of limited significance. It should be mentioned that the nature of the scores could conceivably be attributed to a number of factors other than that of musical experience. Frequently, for example, an individual student in the low group achieved consistently high scores. This could be the result of an inaccurately marked questionnaire, or more likely, might serve to point-up the effect of innate ability. Similarly, it might reflect unusually effective elementary school musical experiences. The effects of these and related factors should not be minimized; however, the most logical explanation would seem to lie in the contrasted experiences of the two groups.

Students had greater difficulty in discriminating alterations of classical music than they did of popular and folk music. The analysis indicated

that discrimination is easiest when the material is familiar to the student and when the most dominant quality of the music is altered.

The data for the Test of Musical Preferences suggested that there was little practical difference between the musical preferences of students in the high groups and those in the low groups. Both groups demonstrated the greatest partiality to popular music. This was the case throughout all three grade levels. The scores indicated that interest in popular music increases from the seventh to the twelfth grades while interest in folk music decreases from the seventh to the twelfth grades. The development of interest in popular music is probably coincidental with adolescence and its corresponding growth in social maturation. The comparatively strong interest in folk music among seventh-grade students is undoubtedly reflective of the emphasis placed on folk music in most elementary and junior high vocal textbooks.

Whereas interest in classical music remained somewhat constant from the seventh to the twelfth grades among students in the low groups, it increased markedly among students in the high groups. This disparity could again be reflective of several factors. It is possible that twelfth grade students, presumably the most mature of those tested, were more positive in their preferences than were the other students. It is conceivable that the effects of musical experiences on musical preferences do not clearly manifest themselves until the ages of seventeen or eighteen. In all probability each of these factors has a partial, but not total, influence.

Comparison of Groups

Nine correlation coefficients were computed in order to make a precise statistical comparison of the two contrasted groups:

Musical experience and Discriminatory ability.....31
Musical experience and Musical preferences.....07
Discriminatory ability and Musical preferences.....16
Harmonic discrimination and Melodic discrimination.....29
Harmonic discrimination and Rhythmic discrimination.....35
Melodic discrimination and Rhythmic discrimination.....39
Preference for classical music and preference for folk music.....21
Preference for classical music and preference for popular music.....08
Preference for popular music and preference for folk music.....17

Although the figures indicate that a positive degree of relationship exists between certain of the factors, none of these correlations is highly significant. It is noteworthy that discriminatory abilities in harmony, melody, and rhythm, correlate more highly than do any of the other factors measured.

Implications

The dominant implications underlying the research are manifest. Regretably, many music curricula for all pupils generally are still dedicated to the objectives of abstract knowledge and material accomplishment. The data quoted here gives testimony to the nominal technical achievement resultant from such emphasis. It is noteworthy that the scores of the seventh graders in this study, unquestionably attributable to their elementary school experiences, are remarkably near those of the ninth and twelfth graders. The goal of *technical proficiency* in the elementary school curriculum, although not entirely absent, is substantially limited and can be a by-product of musical experience which is integrated with the general curriculum. If such a program of music education in the elementary grades can result in technical achievement which so closely approximates the technical achievement of ninth and twelfth grade students, how might the achievement of junior and senior high school students be extended through a similar approach of musical experience integrated in the general curriculum? Hereby would result improvement in an area commonly accepted as a primary objective of secondary school music classes through highly specialized instruction. But here also there would result a scheme of music education in which technical proficiency and factual knowledge are subordinate to enjoyable ,meaningful musical experiences which yield both present and prospective benefits. These experiences would exploit to the fullest the student's creative and appreciative potential.

It is indisputably necessary that secondary school music education develop technical proficiency and performance skill. Inherent in this development, however, and without the sacrifice of achievement, music education affords the possibility of comprehensive integration with the general curriculum and of unlimited contributions to the artistic and social aspects of the student's personality.

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The Alameda County Schools Office is completing a two-year study of educational television. This project was undertaken for the purpose of exploring a wide range of problems relating to the use of television in education. The study has involved teachers, students, and participants at the Governor's Conference on Educational TV. TV programs were produced on local commercial stations to obtain information regarding production problems. Kinescopes were made and shown to selected groups to determine the effectiveness of the kinescope as a teaching aid. It has been concluded that further research is needed on types of educational television programs most suitable for use in public schools and the most effective techniques of presentation. The office of the Alameda County Superintendent of Schools expects to prepare a report for distribution at a future date.

THE EDITORS SAY:—

(Continued from Page 2)

A possible answer, but not an easy one, to the question: "How can our school research departments carry on more broad-gauge studies?" lies in the area of cooperative research between the colleges and the schools. Graduate research is often fragmentary and unrealistic. The graduate student would usually be much happier if he were part of a larger project with a fair chance of contributing significantly to long-range goals.

Effective cooperation in research design between the public schools and the universities is not likely to come from an occasional research conference. Considerable time and energy are almost certain to be required before a workable plan can be designed which will meet fully all the requirements of a worthwhile research problem. The immediate needs of the school system must be provided for while the foundations are being laid for later generalizations and broad-gauge conclusions. Such a study may well take years for full fruition but in the mean time in can provide some answers for specific questions as it develops.

Each school system with a research department might well plan on at least one long-range study in cooperation with nearby teacher-training institutions to the mutual advantage of all. D.W.L.

UCLA to Hold Group Development Laboratory

The Third Western Training Laboratory in Group Development will be held at Idyllwild, California, between August 15 and 27, 1954. The Laboratory is intended to provide understanding and skills for individuals who want to improve their effectiveness in working with groups. Participants with a variety of occupational background are expected to attend. The training staff will be made up of faculty members from various universities as well as from active group leaders in business, government, industry, public health, education, social welfare and the like. For information, write Department of Conferences and Special Activities, University Extension, University of California, Los Angeles 24, California.

Fifth Annual California State Conference on Educational Research

GARFORD G. GORDON
California Teachers Association

The Fifth Annual State Conference on Educational Research, sponsored jointly by the State Advisory Council on Educational Research and the California Teachers Association, was held at the Mar Monte Hotel, Santa Barbara, November 6 and 7. The theme of the 1953 Conference was "Research—A Guide to Current School Practice." The committee which arranged the program was headed by Dr. Alfred S. Lewerenz, Director, Evaluation and Research, Los Angeles City Schools. More than one hnudred seventy persons attended the conference full time while many others attended part of the sessions.

The Conference was welcomed to Santa Barbara at its first general meeting on Friday morning by E. W. Jacobsen, Superintendent of Santa Barbara City Schools. Greetings were also extended by Frank W. Parr of the California Teachers Association and Carl A. Larson of the State Department of Education. Guy T. Buswell, Professor of Education at the University of California, Berkeley, gave the first general address. His topic was "An Evaluation of Educational Research." The text of his talk will be presented in the March issue of the *California Journal of Educational Research.*

At the luncheon meeting of the Conference, which was held in the lounge of the Mar Monte Hotel on Friday, Professor W. H. Cowley of Stanford University spoke on "Two Kinds of Research." The text of his address will be presented in the March issue of the *Journal.*

The work of the Conference was carried on in four sections. Section A was concerned with "Education of the Gifted;" Section B with "Improvement of Test Instruments;" Section C with "Evaluation of Special Areas of Education;" and Section D with "Methodology of Recent Research."

Gifted Children

Section A discussed five aspects of the problem of making adequate educational provisions for intellectually gifted children. These were: Identification of the gifted, the relationship of gifted students to the educational program, characteristics of the gifted, present trends in making provision for them, and the teacher's task with gifted children. The Section concluded that, for the present at least, tests will have to be relied upon for the detection of gifted students in the schools. It was also held by the

majority of those entering into Section discussions that the school program for gifted children should not be the same as that currently being offered for children in general. It was concluded that the problems of gifted children are more apt to be concerned with social acceptance and emotional balance than with studies. It was also agreed that gifted children have fewer problems of all kinds than do most children.

Section A also concluded that, although there has been increased interest in gifted children in recent years, there has been an unfortunate tendency to give lip service to the idea of making provision for them rather than to tackle the problem at the classroom level. The Section was unanimous in the opinion that additional in-service and pre-service training for teachers dealing with gifted children is needed.

Test Instruments

Section B discussed two major aspects of the improvement of test instruments. These were the improvement of test content and educational objectives not adequately measured today. Since members of the staffs of several test publishing concerns were in this Section, it was felt that the results of the Section's work may prove to be very practical. The problem of including suitable items in tests was discussed at length. It was felt that changing conditions sometimes result in items becoming obsolete so that they no longer measure what they are supposed to. The use of item analysis to discover such cases was recommended. The Section felt that one of the major aspects of education not adequately measured by present tests is the degree to which learned material actually functions in the life of the student.

Special Education

Section C dealt with the evaluation of three special areas of education —namely, driver education, education of various types of handicapped students, and adult education. It was decided by the Section that too much of the so-called research dealing with special areas of education is concerned only with finding justifications for the programs. In connection with driver education, the Section formulated five types of problem on which research is needed. These were concerned with the value of the various instructional aids developed for the program, the effect of the program on the driving attitudes of the students, the best placement of driver education in the school program, teacher qualifications, and the effects of driver education on traffic problems as a whole.

In connection with education of handicapped children, the Section recommended that as much objective data as possible be obtained on programs for these children. It was concluded that most such programs have

been inaugurated as the result of pressures rather than as the result of studied recommendations. Some of the areas in which research studies are particularly needed include population trends of handicapped children, instructional materials for them, desirable curriculums, desirable roles for specialists, development of desirable attitudes toward the handicapped on the part of normal children, teacher qualifications, and ways of extending present programs upward from the elementary level.

The Section concluded that the major need of adult education research is for the adoption of a positive rather than a defensive attitude. Research is particularly needed in adult education curriculum and teaching methods.

Administrative Problems

The three areas with which Section D was concerned were school administration, instruction, and guidance procedures. The actual methodology of research played a minor role in the discussions of this Section. The members developed real concern over the basic philosophy and objectives of recent research. It was felt that the lack of a common core of objectives was the major obstacle to the successful development of cooperative research programs. The Section decided that although the communication of research findings to administrators is improving, such findings are still reaching teachers and supervisors too slowly. The ethical problems involved in the use of control groups in guidance studies were discussed but no concensus was reached.

The final general session of the conference consisted of brief presentations of the work of the four Sections, followed by short discussions of the reports. Harold D. Carter of the University of California, Berkeley, gave the report of the Gifted-Child Section (Section A). Merle Elliott of Oakland City Schools substituted for Edward A. Taylor of Alameda County Schools in reporting for Section B, "Improvement of Test Instruments." Dr. Taylor kept the records but illness kept him from making the report to the conference. Charlotte D. Elmott of Santa Barbara City Schools reported for Section C, and Charles W. Bursch II of University of California at Davis reported for Section D.

The Sixth Annual Conference will be held in San Jose, November 5 and 6, 1954.

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The East Bay Research Council is conducting the California Test Norming Project. It is expected to be completed in the spring 1954. The purpose of the Project is to develop a basis for California test norms, and to obtain pupil population data as a basis for sampling studies of norms of various achievement tests. A number of California school districts are participating in both the northern and southern parts of the state.

Audio-Visual Practices in Selected California School Districts

COLEMAN M. HERTS

In 1952 a survey was made to obtain information on the scope and structure of the audio-visual programs in unified school districts in California which had an average daily attendance ranging from 4,000 to 16,000. It was felt that this information would be useful as a guide in developing audio-visual policies in similar districts.

Nature of the Survey

As of the school year 1951-52, there were 10 districts in California falling within this limited category. Seven of these cooperated in the survey by answering a questionnaire form. Six of these seven were also visited by the surveyor.

The informaiton acquired through the questionnaire form involved the following general areas:

1. A.D.A. for school year, 1951-52
2. Internal School organization, 1951-52
3. Audio-visual personnel, 1951-52
4. Scope of audio-visual services, 1951-52
5. Audio-visual equipment inventory and distribution policy, 1951-52
6. Audio-visual materials inventory, 1951-52
7. Audio-visual budget, 1951-52
8. Future audio-visual policy changes anticipated as of 1951-52

The survey furnished the information upon which the following findings were based:

Audio-Visual Personnel

Tables I and II indicate, respectively, the number of full-time and half-time audio-visual personnel serving four selected school systems with respect to audio-visual functions only and three selected school systems with respect to both audio-visual and library functions.

The mean ratio of personnel per 500 A.D.A. for the former group was .19 as compared to .35 for the latter group. This difference was logical since the combined services involving audio-visual and library functions required almost double the expenditure of time and effort.

Tables I and II also reflect an interesting fact in that size of district, with respect to A.D.A., did not necessarily indicate a high ratio of per-

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sonnel. For example, in Table I, School District E with 13,000 A.D.A. had a personnel ratio of .30, while School District B with 14,650 A.D.A. had a ratio of .07. This fact is also indicated in Table II — but not to such a degree — wherein School District D, with 10,000 A.D.A. had a personnel ratio of .40, while School District G with 15,974 A.D.A. had a personnel ratio of .28.

Table I

Audio-Visual Personnel in Relation to Size, 1951-52, In 4 Districts Having A-V Departments Limited to A-V Services

Sch. Dist.	*Size of District*			*A-V Personnel*		Ratio A-V Personnel per 500 A.D.A.
	A.D.A.	Buildings	Teachers	Full Time	Half Time	
E	13,000	19	496	4	1	.18
C	13,486	19	457	7	2	.30
F	14,554	20	502	5	2	.21
B	14,650	26	505	2	0	.07
Mean Ration of Audio-Visual Personnel per 500 A.D.A						.19

Table II

Audio-Visual Personnel in Relation to Size, 1951-52, In 3 Districts Having A-V Departments Combining A-V and Library Services

Sch. Dist.	*Size of District*			*A-V Personnel*		Ratio A-V Personnel per 500 A.D.A.
	A.D.A.	Buildings	Teachers	Full Time	Half Time	
D	10,000	15	360	7	2	.40
G	15,974	27	622	9	0	.28
A	6,158	12	249	4	1	.38
Mean Ration of Audio-Visual Personnel per 500 A.D.A						.19

It would appear from these data that the larger the A.D.A., the smaller the relative quantity of audio-visual personnel involved in carrying out the functions of the audio-visual department. This may or may not indicate more efficiency since the quality of service must be taken into consideration as well as the quantity of service personnel involved. The survey did not measure quality with respect to personnel.

Audio-Visual Services

Table III indicates the scope of audio-visual services of seven selected audio-visual departments. Of the 15 specific categories of audio-visual services, no one department rendered all of them. The number of services ranged from 14, or 93% of the categories, by District D, to 8, or 54% of the categories, by District G. The mean percentage of categories in which services were rendered by each district was 74.6.

Table III

Scope of Services of Seven Selected Audio-Visual Departments, 1951-52

Service Rendered	School Districts A	D	E	C	F	B	G	Totals	Percentage of Districts per Service
A-V Equipment		X	X	X	X	X	X	6	85
Flat Pictures	X	X	X	X	X	X	X	7	100
Recordings	X	X	X	X	X	X	X	7	100
Art Prints	X	X	X	X	X	X	X	7	100
Films and Slides	X	X	X	X	X	X	X	7	100
Exhibits	X	X	X	X	X		X	6	85
Maps	X	X	X		X	X	X	6	85
Textbooks	X	X					X	3	43
Reference Books	X	X					X	3	43
Field Trips	X	X	X		X	X	X	6	85
Classroom Environment	X	X	X	X	X		X	6	85
Teachers' In-service training		X	X	X	X	X	X	6	85
Student Helpers		X	X	X	X		X	5	71
Costumes				X				1	14
Photography		X	X	X	X			4	57
TOTALS	10	14	12	11	12	8	13	80	
Percentage of Service Per District	67	93	80	71	80	54	87		

Mean Percentage of Services per District = 74.6
Mean Percentage of All Districts per Service = 75.9

Table III further indicates that only four of the 15 services were rendered by all seven school districts. These included flat pictures, recordings, art prints, and films and slides. At the other end of the scale, only one district furnished a costume service (District C). The mean percentage of districts rendering each of the 15 services was 75.9.

Table IV

Overview of Audio-Visual Equipment Inventories in Relationship to A.D.A. of Six Selected School Districts, 1951-1952.

DISTRICT	D		E		C		F		B		G		Mean Ratio per 500 A.D.A.	Standard, Schwartz	Amount Mean Ratio Above or Below Standard
A.D.A.	10,000		13,000		13,486		14,554		14,650		15,974				
ITEM	No.	*	No.	*	No.	*	No.	*	No.	*	No.	*			
Motion Picture Projectors	20	1.0	24	.92	74	2.74	38	1.31	24	.8	57	1.8	1.43	1.0	+ .43
Strip/Slide Projectors	30	1.5	34	1.3	114	4.22	44	1.52	30	1.0	51	1.6	1.86	1.0	+ .86
Opaque Projectors	5	.25	10	.38	21	.78	1	.03	1	.03	16	.5	.33	?	?
Overhead Projectors	1	.05	10	.38	7	.26	7	.24	3	.09	30	.94	.33	?	?
Screens	60	3.0	23	.88	59	2.19	82	2.8	?	?	84	2.6	2.3	1.6	+ .70
Record Players	75	3.75	62	2.38	282	10.4	74	2.55	92	3.1	106	3.3	4.25	1.6	+2.65
Tape Recorders	10	.5	12	.46	33	1.22	17	.59	2	.06	13	4.1	1.16	?	+
P. A. Systems	15	.75	27	1.0	10	.37	8	.28	1	.03	12	.38	.47	?	?
Intercom. Systems	15	.75	2	.08	4	.15	0	0.0	1	.03	3	.09	.18	?	?
Radios	30	1.5	20	.76	84	3.11	60	2.07	70	2.4	27	.84	1.78	1.0	+ .78
Television Sets	6	.3	1	.04	1	.04	0	0	3	.09	0	0.0	.08	?	?

* *Ratio of Equipment per 500 A.D.A.*

Audio-Visual Equipment

Table IV indicates the degree of adequacy of the audio-visual equipment inventories of six selected audio-visual departments in relationship—*wherever applicable*—to the minimum standards advocated by Schwartz.[1]

The range of the mean ratio of items of equipment for each 500 A.D.A. ran from a high of 4.25 for record players to a low of .08 for television sets. The data indicated that these six selected school districts were well in advance of the national minimum standards proposed by Schwartz in 1950.

Audio-Visual Materials

Table V indicates the quantity of audio-visual materials that was available in five selected school districts. With respect to these inventories, it is not possible to compare them adequately to national minimum standards since the writer could not find any comparable data. However, it is probably safe to conclude that the *trend* is for a continual rise in the amount of audio-visual material being made available to these five selected school districts. This conclusion is partially based upon the fact that these districts exceeded Schwartz's national minimums.

Table V

Overview of Audio-Visual Materials Inventories in Relationship to A.D.A. of Five Selected School Districts, 1951-1952.

DISTRICT	D		E		F		B		G		Mean Ratio per 500 A.D.A.
A.D.A.	10,000		13,000		14,554		14,650		15,974		
ITEM	No.	*	No.	*	No.	*	No.	*	No.	*	
Motion Pictures	119	5.9	0	0.0	75	2.5	131	4.5	838	26.1	9.8
Still Pictures	744	37.0	300	11.5	3,796	130.9	2,286	78.8	2,744	85.7	57.3
Flat Pictures	163	8.1	150	5.7	34,700	1,196.5	9,432	325.1	25,000	781.2	386.1
Exhibits	63	3.1	0	0	3,161	108.9	34	1.1	464	14.5	31.9
Recordings	234	11.7	900	34.6	300	10.3	3,875	133.6	1,394	43.5	48.7

* *Ratio of Materials per 500 A.D.A.*

The range of the mean ratio of items of material for each 500 A.D.A. ran from a high of 386.14 for flat pictures to a low of 9.81 for motion pictures.

[1] John Charles Schwartz, Jr., *Evaluative Criteria for an Audio-Visual Instructional Program.* Dubuque, Iowa: Wm. C. Brown Company, 1950, 39 pp.

It *is* possible to compare, however, the adequacy of motion picture titles available in these five selected school districts with those of six midwestern states as reported by McKown.[2] The highest ratio of films to population reported by McKown was 2.59 films per 1,000 population in Indiana in 1948, while Table V indicates a mean ratio of 19.62 films per 1,000 A.D.A. in these California districts in 1951-52.

Audio-Visual Budgets

Table VI indicates the budgetary break-down of audio-visual expenditures of the six selected school districts. The information presented is very spotty and so does not lend itself to adequate comparison. In addition, information of this kind on the state level and the national level is just as inadequate.

The data indicatee that no satisfactory nor complete nor standardized system of audio-visual budget and cost accounting had been, or was being used by these six selected school districts at least.

Table VI

Overview of Audio-Visual Budget Items of Six Selected School Districts, 1951-1952.

Budget Items	School Districts					
	A	D	E	F	B	G
Adm. & Supv.	?	?	$15,200	?	?	?
Maint. & Repairs	?	?	1,200	$5,000	?	?
Equip. Purch.	?	$1,000	6,500	4,000	?	0
Equip. Rented	?	0	0	0	?	0
Materials Purch.	?	3,400	1,000	3,000	$12,880	$8,000
Materials Rented	$2,422	1,600	3,000	7,000	2,500	1,500

Reflections Upon the Survey

While the limited nature of the data do not permit any broad conclusions to be drawn, the following observations would seem to be in order:

[2] Harry C. McKown and Alvin B. Roberts, *Audio-Visual Aids to Instruction.* New York: McGraw-Hill Book Co., 1949, 608 pp.

A. Audio-Visual Personnel: The larger the A.D.A. served, the smaller the relative quantity of personnel is involved

B. Audio-Visual Services: A good standard of audio-visual service, with respect to scope, was being rendered.

C. Audio-Visual Equipment: An adequate and rising quantity of audio-visual materials was being obtained by school districts.

D. Audio-Visual Materials: An adequate and rising quantity of audio-visual materials was being obtained by school districts.

E. Audio-Visual Budgets: Budget and cost accounting with respect to audio-visual functions were inadequate.

Limitations of the Survey

A. The survey sought and reflected quantitative data as opposed to qualitative data.

B. The percentage of returns to the survey questionnaire were good—70%—but the actual number of returns were few, seven in number. (However, the responses covered 70% of the school districts falling within the scope of the survey.)

C. In two areas of the survey, the data was particularly inadequate:

1. Concerning budget (as indicated in Table VI)
2. Concerning audio-visual materials. (The writer set up the part of the questionnaire covering this area in order to get responses as to quantity of materials on hand broken down into curriculum areas. However, only one of the five districts reporting was able to indicate such a breakdown.)

Under the direction of Mrs. Helen Cowan Wood, Consultant in Elementary Education and Project Director, the Fresno County Superintendent of Schools' office is conducting a study on the educational program for migrant children. It is sponsored by the Rosenberg Foundation and has been under way since October. It is expected to be concluded in one year. This project will include status studies, development of experimental materials and procedures, and other activities for the development of curriculum to meet the needs of children in schools with large migrant populations.

* * * * *

Two new kits are available to help local schools with current difficult problems. The NEA offers a teaching kit, "United Nations in the Schools," with a teacher's handbook. Write to the NEA, Committee on International Relations. The National Advertising Council, cooperating with the National Citizens Commission for the Public Schools, offers a variety of aids in its Better Schools Campaign. Write Department AC, The Advertising Council, 25 West 45th St., New York City 36.

An Experiment in Predicting The Ability of Eighth Grade Students To Work Simple Algebra Problems

JOHN A. SCHWELLENBACH

Beginning algebra has long been a stumbling-block for high school students: there is a high percentage of failures and a large amount of help outside the classroom is required to avert other failures. Because of this great amount of wasted time and effort, there is increasing interest in methods of predicting pupils' success. As these methods are perfected, pupils whose chances of success in algebra are slight could be diverted into courses in applied mathematics and those who seem to have exceptional ability could be encouraged to pursue work along special lines.

The Problem

The purpose of this study is to determine the relative effectiveness of four methods and combinations of the methods in predicting the success of Oroville Elementary School eighth grade pupils in solving simple algebra problems. The methods investigated are (1) a standardized arithmetic achievement test; (2) I.Q.'s; (3) a standardized prognostic test; and (4) eighth grade arithmetic achievement.

Related Literature

Of seven previous studies employing comparable predictive devices five (1, 2, 3, 4, 5) found a prognostic test to be the best measure of success, one (6) found arithmetic grades best, and one (7) found an achievement test to be the best measure. However, only two (4, 6) of the seven used all four of the predictive devices and three (1, 2, 3) of the five who found the prognostic test to be the best measure of success did not have an achievement test score, so that it is difficult to draw any conclusions.

In almost all the studies it was pointed out that the success of the predictive factors could not be accurately measured because such items as pupil motivation, home and school relationships, teacher personality

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and skill, and study habits varied by some unknown amount. This study held these factors as nearly constant as possible by allowing only a short time to elapse between the measuring of the predictive factors and the measuring of the achievement factor, and by using the same teacher throughout the study. Another limitation of previous studies is that they are concerned only with the students who elected to take algebra, with the result that the effectiveness of the predictive factors for the lower group of students is inadequately measured, if at all. This study measures every student's success in algebra, thus testing whether the students who would not be allowed to take algebra according to the test should actually be eliminated.

Methods

The group studied consisted of 108 eighth grade students of Oroville Elementary School who were in attendance from September, 1949 to April, 1950 and who were present on the days that the tests were administered. The group was divided into four sections, and all were taught arithmetic by the same teacher. Scores on the Progressive Achievement Test, given about one month preceding the algebra course and the California Test of Mental Maturity scores, given five months preceding the algebra course, were obtained from the school files. The Iowa Alegbra Aptitude Test was given by the arithmetic teacher two weeks before the algebra course specifically for this study. Eighth grade achievement scores were obtained by totaling the scores made on all the teacher-made tests for the seven months preceding the algebra course, with make-up test scores replacing regular scores wherever necessary. The algebra achievement score consists of the total of four teacher-made tests administered at the end of each week that algebra was taught.

Zero Order Correlations

The following table gives the correlation of the predictive devices with the algebra scores, as well as the intercorrelations of the predictive devices which are used in determining the multiple correlations.

It is interesting to note in this table that the highest correlation, .82, found between a predictive device and success in algebra is exhibited by the Progressive Achievement Test—arithmetic score, rather than by the Iowa Algebra Aptitude Test. Also that the non-language I.Q., which is often thought to include the abilities necessary for mathematics, was found to have a correlation of only .47 while the language I.Q. had a correlation of .65. And even though it is often stated that a reading test is the best measure of success in algebra, the correlation between the total reading section of the Progressive Achievement Test and algebra success was found to be only .56.

Table I

Zero Order Correlations

Factors used

1. Algebra scores
2. Eighth grade arithmetic scores
3. Progressive Achievement Test — arithmetic score
4. Iowa Algebra Aptitude Test
5. Total I.Q. as determined by the California Test of Mental Maturity
6. Non-language I.Q.
7. Language I.Q.
8. Progressive Achievement Test — reading score

	2	3	4	5	6	7	8
1	.78	.82	.78	.64	.47	.65	.56
2		.88	.76	.76			
3			.77	.75			
4				.69			

NOTE: The first row represents the correlations of each of the predictive devices with the algebra scores while row 2 give the intercorrelations of the factors used in determining multiple correlations with arithmetic grades.

Indices of Forecasting Efficiency

The efficiency of the predictive measures may be estimated from the formula

$$E = 100\left[1 - \sqrt{\frac{N-1}{N-2}\,(1-r^2)}\right] \quad (8)$$

where E represents the percentage of reduction in the errors of prediction for a given r. Application of this formula to the best correlation, .82, yields an index of forecasting efficiency of 42.42. That is, even for this relatively high correlation the errors of prediction are reduced by less than one half.

Multiple Correlations

The method of determining multiple correlations in this study consisted of first determining the coefficients of the individual z scores to be used in finding the composite $\overline{z}$ score estimate. This was accomplished by solving the following n equations for the n β's:

$$r_{12} = \beta_1 + \beta_2 r_{23} + \ldots + \beta_n r_{2(n+1)}$$
$$r_{13} = \beta_1 r_{32} + \beta_2 + \ldots + \beta_n r_{3(n+1)}$$

$$r_{1(n+1)} = \beta_1 r_{(n+1)2} + \beta_2 r_{(n+1)3} + \ldots + \beta_n$$

These β's were then substituted in the following formula for the multiple correlation:

$$R_{1 \cdot 23 \ldots n} = \sqrt{\beta_1 r_{12} + \beta_2 r_{13} + \ldots + \beta_n r_{1(n+1)}}$$

The best correlation revealed from the data was .856 which was obtained from weighted scores from all four predictive factors. The index of forecasting efficiency for this correlation was 48.1.

The best combination of two variables, the Progressive Achievement Test and the Iowa Algebra Aptitude Test, yielded a correlation of .853, only three thousandths less than using all four.

The Regression Equation

The score to be used for each individual is found by adding the product of the coefficient β_n determined for each measure and the z score for that measure, that is

$$\overline{z}_1 = \beta_1 z_2 + \beta_2 z_3 + \ldots + \beta_n z_{n+1}$$

An individual's $\overline{z}_1$ then represents the best estimate one can make, using the scores at hand, of his probable success in algebra.

Actual and Predicted Placement

Since in this study the success in algebra of all students was measured, it is possible to determine the extent to which successful students would have been eliminated by the predictive measures.

Table II

Successful Students Eliminated by the Predictive Measures

Predictive measure	Successful students (above median) in fourth quartile of each predictive measure: Number	Per cent of students in fourth quartile
Previous arithmetic achievement	3	11
Progressive Achievement Test	1	4
Iowa Algebra Aptitude Test	1	4
I.Q.	4	15
Progressive Achievement Test and Iowa Algebra Aptitude Test	1	4

The extent to which the unsuccessful students were not eliminated by the predictive measures is presented in Table III.

Table III

Unsuccessful Students Not Eliminated by the Predictive Measures

Predictive measure	Unsuccessful students (below median) not in fourth quartile of each predictive measure: Number	Per cent of unsuccessful students
Previous arithmetic achievement	28	52
Progressive Achievement Test	27	50
Iowa Algebra Aptitude Test	29	54
I.Q.	31	58
Progresive Achievement Test and Iowa Algebra Aptitude Test	29	54

Conclusions

1. A standardized achievement test in arithmetic predicted success in algebra better than the Iowa Algebra Aptitude Test, a standardized test supposedly designed to predict success in algebra. This would indicate that the content of the aptitude test could be improved.

2. The combination of the Progressive Achievement Test—arithmetic score and scores on the Iowa Algebra Aptitude Test yielded a more accurate index of forecasting efficiency which was, in fact, 6 per cent better than the scores of the achievement test alone. Whether this improvement is sufficient to justify the additional time and expense in using two tests remains for each administrator or teacher to decide for himself.

3. The addition of the factor of achievement in eighth grade arithmetic and the I.Q. to the predictive measures did not materially increase the index of forecasting efficiency.

4. The probable success of each student should be used not only as a screening device but also as an aid to the teacher in adjusting the instruction to fit the needs of the student.

5. Correlations of the order of .80 indicate the degree to which achievement in algebra has been predicted. This indicates that the device used can be of help to the teacher as a check upon the progress of instruction.

6. The data in this study applies only to the school district from which it was obtained. Similar data should be obtained from each district in which predictions are to be made.

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Myrta Blackman and Mildred Muller of Porterville Elementary Schools have completed a study comparing reading achievement and grade placement for 304 seventh graders. They have concluded that the number of children in the seventh grade with IQ above 100 who are underachieving in reading constitutes a larger group than is generally supposed. They recommend that schools give teachers more help in meeting the interests and needs of superior children. They plan, in Porterville, to attempt to identify superior children who are underachieving in reading early in the school year. In-service training to help teachers develop techniques for helping superior children is also planned.

Educational Functions Of The County Superintendent Of Schools In California

ROBERT BRUCE WALTER

Purpose

The purpose of the present study was (1) to re-examine the value of some of the older educational functions of the county superintendent in California; (2) to determine the extent to which important functions were performed, chiefly during the base year of 1946-47 (the last year that unapportioned funds were in use), as indicated by expenditures, number of personnel, and amount of professional materials; and (3) to suggest desirable standards in connection with the performance of important educational functions.

Procedure

Data concerning personnel and materials were obtained from county superintendents by means of a questionnaire. Actual expenditures were obtained from state records. Estimates of desirable expenditures and of the desirable number of employees were furnished by county superintendents. Expenditures by functions were reduced to a comparable basis for the various counties by dividing the total expenditure for each function by the average daily attendance in noncity districts. The resulting unit cost was termed the cost per unit of "A.D.A served." To obtain a basis for comparing the number of personnel for each function for the various counties, the number of teachers in noncity districts in each county was divided by the number of employees in the county superintendent's office for the function. The resulting unit was termed the number of "teachers served."

Findings

Major findings of the study were as follows:

1. There was a lack of close agreement among county superintendents as to the interpretation of certain provisions of the Education Code, such

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as those relating to superintending the schools of the county and enforcing the course of study.

2. An analysis of expenditures from the unapportioned funds and of personnel paid from these funds during the base year of 1946-47 showed that approximately one third of the fifty-seven counties made no expenditures for curriculum development, research and guidance, and health supervision. The analysis also showed that approximately one half of the counties had no certificated personnel for curriculum development, research and guidance, or audio-visual education.

3. The survey of miscellaneous aspects of county superintendents' offices revealed that (a) thirty-one counties had produced a total of 599 publications of ten pages or more from 1941 to 1946, (b) county teachers' libraries of forty-three counties had purchased 3,316 books during 1945-46, (c) $1.79 per teacher served had been spent for county teachers' libraries during the base year of 1946-47, (d) twenty-five counties had purchased a total of 2,088 films during 1945-46, (e) audio-visual contract service was furnished to districts during the base year of 1946-47 by fourteen counties, (f) the expenditure per teacher served during the base year of 1946-47, in all counties, for county teachers' institute was $1.87, (g) ten county superintendents received excess payments, based on the base year of 1946-47 A.D.A., for education of physically handicapped children at the elementary school level, and seven county superintendents received such payments on A.D.A. of that year for education of such children at the secondary level, (h) on July 1, 1946, for the state as a whole, county superintendents owned land and buildings worth $27,000 and equipment worth $314,000, all of which had been purchased from unapportioned or elementary supervision funds.

4. The mean desirable "unit expenditure" from unapportioned funds for all functions and all counties during the base year of 1946-47, calculated from estimates of forty-eight county superintendents, was $7.298 as compared with a mean actual "unit expenditure" for that year of $4.086.

5. The amount of money needed from state funds to finance a desirable educational program during 1947-48, exclusive of supervision of instruction, was found to be approximately $3.50 per unit of A.D.A., instead of the maximum of $3.00 prescribed by law.

6. A suggested formula for apportionment of state moneys to county school service funds was developed. The basic data for the formula were the mean desirable "unit expenditures" and the mean A.D.A. for six groups of counties obtained from a regrouping on the basis of A.D.A. served. These data when plotted to form a graph resembled closely the

curve for an equilateral hyperbola, the general formula for which is $y = a + \frac{b}{x}$. By the use of this formula the desirable expenditure factors per unit of A.D.A. for each county were determined on the basis of A.D.A. in noncity districts for the base year of 1946-47, A.D.A. in noncity districts for 1948-49, and A.D.A. in noncity and small city districts for the latter year.

7. The mean desirable number of "teachers served" per certificated county office employee paid from unapportioned funds, for all functions and all counties during the focal year of 1946-47, based on the estimates of forty-four county superintendents, was twenty-four, as compared with sixty-nine, the mean actual number of "teachers served" during that year.

8. The mean desirable number of "teachers served" per noncertificated county office employee paid from unapportioned funds during 1946-47, based on the estimates of forty-four county superintendents, was sixty-two, as compared with 152, the mean actual number of "teachers served" during that year.

9. Desirable standards for miscellaneous aspects of educational functions of county superintendents' offices, based on opinions of selected county superintendents, included (a) the preparation of a new, or materially revised, course of study for the elementary schools of each county once every four or five years; (b) the development of a minimum of approximately one hundred pages of instructional aids for teachers of each county each year; (c) the addition of approximately one professional book per teacher to the county teachers' library each year; (d) the provision of approximately twenty films, twenty film strips, ten sets of 2″ x 2″ slides, and ten sets of 3¼″ x 4″ slides for each teacher each year; (e) the payment of approximately $.50 per unit of A.D.A. by school districts each year for county audio-visual service; (f) the expenditure of approximately $5.00 per teacher per year for county teachers' institute; (g) the integration of county teachers' institute with the total in-service education program of the county by means of cooperative planning; and (h) the preparation of a report of work accomplished and of work planned by each county superintendent at least once every four years.

Recommendations

The following recommendations are made:

1. A well-balanced program of educational service should be furnished by each county superintendent.

2. The legal provisions concerning the main duties of the county su-

perintendent, such as superintending the schools of the county, should be clarified and placed upon a uniform basis for the entire state by an attorney general's opinion or by action of the state legislature.

3. The annual report of expenditures and personnel for the county school service fund should be revised to correspond with the county school service fund budget.

4. Consideration should be given to increasing the base for the county school service fund to $3.50 per unit of A.D.A. (1953-54 apportionment will provide approximately $4.51 per A.D.A.—Ed.)

5. State apportionments for supervision of instruction should be used exclusively for supervision in districts under 900 units of A.D.A.

6. The State Department of Education should use apportionments based on the formula developed during the present study for comparison with proposed apportionments having other bases.

7. The desirable standards for miscellaneous aspects of educational functions of county superintendents' offices based on the opinions of selected county superintendents and listed in the findings of the present study should be used as standards until other standards based on a more comprehensive study have been developed.

8. Studies of the following should be made: (a) the eligibility of school districts for educational services provided by the county superintendent; (b) the basis for an equitable distribution of county school service fund money to the various counties; (c) salaries of certificated and noncertificated employees of all county superintendents of the state; (d) suitable credentials for professional staff members of county superintendent's offices; (e) types and amounts of instructional aids which should be furnished by the county superintendents' offices.

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The Research Department of the Oakland City Schools is making a study of pupil migration under the leadership of Director Merle H. Elliott. The entire elementary school population of Oakland is involved. The study will cover all pupil transfers from September 1952 to September 1953.

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Both Ventura and San Mateo Counties have completed follow-up studies of recent high school graduates. In San Mateo County students graduating in 1947, 1950, and 1952 were studied. In Ventura County those graduating in 1949 were surveyed. Questionnaires were sent to the graduates involved in both cases. School records were also consulted. Ventura County has published a very comprehensive report of the study titled "After Graduation What?" Information on the San Mateo study is contained in a mimeographed report issued by the Department of Guidance of the County Office.

Research News and Views

The State of New York has going a six year study on the prediction of teaching effectiveness in secondary school teaching under the State Education Department. While the study is only in mid course, there is encouraging data to support the hope that a reasonably simple and reliable prediction index will be devised. *Journal of Teacher Education*, September 1953, pages 230-34.

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Teachers of spelling will be interested in the "core vocabulary of spelling words" developed at the University of California by George C. Kyte and Virginia McNeel. The list may become the nucleus of a local or might be used as the basis for teacher-made tests in spelling. The list is covered in an article in *The Elementary School Journal*, September 1953. Further inquiry could be addressed to Professor Kyte at the University of California.

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An abundance of research data on the mechanical aspects of mathematics instruction is contained in a recent U. S. Office of Education bulletin. It gives by grade levels such information as time allotted, size of classes, number of teachers, graduation requirements, holding power, and content. It is not a handbook on instructional procedures for the classroom teacher. U. S. Department of Health, Education and Welfare, Office of Education Bulletin 1953, No. 5. *Mathematics in Public High Schools* by Kenneth E. Brown. 47 p. 20 cents.

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Falk and Booth, San Francisco architectural firm, will mail free on request charts showing the relationship of California births of previous years to the graded enrollments in the schools on October 31, 1953. There are two sizes, 8½ x 11 and 18 x 24. Their address is 9 Main Street, San Francisco.

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Staff-pupil ratios for certificated and non-certificated employees in schools of Southern California are reported in a monograph of the CTA Southern Section, Research Monograph 16. The data were collected at the end of the 1952-53 school year and are determined by the a.d.a. for the year divided by the total number of certificated personnel employed.

Book Reviews

The Student Teacher in the Elementary School

John U. Michaelis and Paul R. Grim. New York: Prentice-Hall, Inc., 1953 xii+ 433 pp.

Intended to be a "practicum" on supervised teaching in elementary level, the Michaelis-Grim text offers information and counsel in analyzing the teaching-learning situation, lesson planning, individual pupil study, community relationships, educational philosophy, teaching aids, and evaluation techniques. Chapters are devoted to helping exceptional children and the problems of self discipline and group behavior.

Various chapters are contributed by other than the primary authors. The student teacher code of ethics developed by the California Student Teachers Association is included, as well as many fine references and checklists from national yearbooks. Detailed steps in the development of both lesson plans and units should make the book valuable to the prospective teacher. A final chapter on personal attention to in-service growth and professional attitude adds an excellent closing touch.

Mentally Retarded Students in California Secondary Schools

Flora M. Daly and Leo F. Cain. California State Department of Education Bulletin, Vol. XXII, No. 7. Sacramento, October 1953. xiv+ 200 pp.

The bulletin is the report of the 1950-51 study of the education of mentally retarded youth in secondary education, completed by the San Francisco State College and the State Department of Education. The study collected information on social, economic, and education problems connected with mentally retarded adolescents. A clear definition of the mentally handicapped is offered and data on the growing enrollments of these children in the public schools.

The techniques of the study are well described. The bulletin is rich in case study detail and the kinds of information needed for work with these youth. It is, further, quite comprehensive in the scope of problems it covers: attendance, academic achievement, work experience, class and school organization, step-by-step analysis of a desirable program of education for mentally retarded. The book would appear to be a valuable contribution in its field.

The American Elementary School

Thirteenth Yearbook of the John Dewey Society. Edited by Harold G. Shane. New York: Harper and Brothers, 1953. xi+ 434 pp.

The yearbook is the characteristic symposium type of publication which comes from our national societies. It is a thorough attempt to be a comprehensive compendium in the field of elementary education. Its authorship is nation wide in its representation. The chapter-essays attempt to summarize the best prevailing knowledge of elementary education and to appraise the American elementary school performance in achieving these goals.

A chapter treats of current concepts of "theory of learning" and essays a synthesis of the various contributing viewpoints. Still another examines the significance of new information on child growth and development. The chapter on curriculum interpretation offers a good overview of developments since 1930. This with an appendix giving a chronology of significant events in American elementary education provides a very convenient source of historical information.

State Equalization of Local Assessments

Eugene C. Lee. Berkeley: University of California, Bureau of Public Administration, January 1953. 44 pp.

The publication is one of a series of monographs on legislative problems prepared at the request of the California Legislature, employing the services of the University as a research agency. The study includes historical background of the property tax and the causes of the unequal assessment problem. A survey of national practice is covered in the monograph with special detailed reviews of the procedures in several states. The California situation is reviewed thoroughly with attention given to 1949 legislation and subsequent events. While the monograph by intention makes no recommendations, it does provide an excellent review of the problem.

School District Liability

American Association of School Administrators. Washington, D.C., the Association, 1953. 23 pp.

The brochure is a brief exposition of the significance of school district liability and the problems connected with the protection of the district and its staff from damages. References are made to varying state statutes and court cases in which liability is the dispute.

Various aspects of liability are treated separately: negligence, trespass, injury to pupils, injury to employees, liability in transportation. The booklet ends with a checklist of "do's." The subject, covered by the booklet, is timely, and there is underway in California at the moment a thorough survey of the significance of the problem to local districts.